

**What is claimed is:**

- 1 1. A chuck device for containers comprising:
  - 2 a supporting structure;
  - 3 a pair of arms rotatably supported on said supporting structure by way of a pair of
  - 4 arm shafts, chuck claws for grasping a container being disposed on ends of said pair of
  - 5 arms that open and close in tandem with a rotation around said arm shafts; and
  - 6 an operation member capable of being externally operated;
  - 7 wherein:
    - 8 inward from said pair of arms is disposed a first drive section capable of integrally
    - 9 rotating around said arm shaft of a first arm and being integral with said first arm, and a
    - 10 second drive section disposed further toward said end of said arm than said first drive
    - 11 section and capable of rotating integrally around said arm shaft of a second arm and being
    - 12 integral with said second arm;
  - 13 a biasing mechanism which biases said pair of arms around said arm shafts in a
  - 14 direction of closing said ends of said arms;
  - 15 a motion input mechanism disposed between said operation member and said first
  - 16 drive section which converts motion accompanying external operation of said operation
  - 17 member to a rotation motion of said first drive section centered around said arm shaft; and
  - 18 a coupling mechanism disposed between said first drive section and said second
  - 19 drive section which converts rotational motion of said drive section around said arm shaft
  - 20 to a rotational motion of said second drive section around said arm shaft.
- 1 2. A chuck device as described in claim 1 wherein said motion input mechanism comprises
- 2 a cam mechanism to convert a motion of said operation member to rotation motion of said
- 3 first drive section.
- 1 3. A chuck device as described in claim 2 wherein:

2        said cam mechanism of said motion input mechanism is equipped with an arm drive  
3        cam supported by said support structure to allow rotation around a cam axis line parallel to  
4        said arm shaft, a cam surface being formed on an outer perimeter of said arm drive cam;

5        said arm drive cam being disposed opposite from said second drive section relative  
6        to said first drive section;

7        such that said arm drive cam being rotated by operation of said operation member  
8        from outside;

9        as said arm drive cam rotates, said cam surface of said arm drive cam moves back  
10      and forth between a position where said first drive section is pushed out toward said second  
11      drive section and a position where said first drive section is retracted to an opposite side  
12      from said second drive section.

1        4. A chuck device as described in claim 3 wherein a first roller that comes into contact with  
2        said cam surface of said arm drive cam is disposed on said first drive section.

1        5. A chuck device as described in claim 3 wherein:

2        a roller shaft parallel to said arm shaft is disposed on said first drive section; and  
3        on said roller shaft, there is disposed a first roller coming into contact with said cam  
4        surface of said arm drive cam, and a second roller coming into contact with said second  
5        drive section.

1        6. A chuck device as described in claim 3 wherein a support section is disposed on said  
2        cam surface of said arm drive cam to support said first drive section at said position pushed  
3        out toward said second drive section.

1        7. A chuck device as described in claim 1 wherein said coupling mechanism comprises a  
2        cam mechanism to convert rotation motion of said first drive section to rotation motion of  
3        said second drive section.

1       8. A chuck device as described in claim 7 wherein said cam mechanism of said coupling  
2       mechanism is equipped with a cam surface disposed on said second drive section and  
3       coming into contact with said first drive section.

1       9. A chuck device as described in claim 1 wherein said biasing mechanism includes a  
2       spring disposed between said support structure and said second arm and biasing said second  
3       arm so that said chuck claws are biased in a closing direction.

1       10. A chuck device as described in claim 1 wherein said biasing mechanism includes  
2       torsion coil springs on each of said pair of arm shafts to bias said pair of arms so that said  
3       ends are biased in a closing direction.

1       11. A chuck device as described in claim 3 wherein:  
2                said biasing mechanism includes, torsion coil springs disposed on each of said pair  
3        of arm shafts to bias said pair of arms so that said ends are biased in a closing direction; and  
4                both ends of a cam shaft rotatably supporting said pair of arm shafts and said arm  
5        drive cam are supported by said supporting structure.

1       12. A conveyor device for containers comprising:  
2                a chuck device as described in claim 1 ; and  
3                a mobile body moving said support structure of said chuck device along a  
4        predetermined conveyor path.

1       13. A conveyor device as described in claim 13 wherein a plurality of said chuck devices  
2       are disposed on said mobile body along said conveyance path.

1       14. A conveyor device as described in claim 12 wherein an operation section is disposed  
2       along said conveyance path that comes into contact with said operation member when said  
3       chuck device moves.

1 15. A conveyor device as described in claim 14 wherein said operation section includes a  
2 movable section capable of moving between an active position, where said operation  
3 section is in contact with said operation member and operates said operation member, and a  
4 stand-by position away from said operation member.

1 16. A conveyor device as described in claim 15 wherein said movable section is driven by  
2 an electrical servo motor between said active position and said stand-by position.

1 17. In a chuck device wherein a chuck claw is removably mounted on an end of an arm  
2 driven to perform a grasping action,

3 a chuck device wherein:  
4 a cylindrically indented bearing surface is disposed on said arm;  
5 a holding piece equipped with a cylindrical outer perimeter surface curved along  
6 said bearing surface is disposed on said bearing surface using a tightening mechanism; and  
7 an attachment base curved along said bearing surface and capable of being inserted  
8 between said support piece and said bearing surface disposed on said chuck claw.

1 18. A chuck device as described in claim 17 wherein said tightening mechanism comprises  
2 a bolt.

1 19. A chuck device as described in claim 18 wherein a slit is formed on said attachment  
2 base of said chuck claw to allow said bolt to pass through.

1 20. A chuck device as described in claim 18 wherein:  
2 a chuck bearing is disposed on said arm to receive reaction generated on said chuck  
3 claw during said grasping action;  
4 said bearing surface is formed to connect with a side of said chuck bearing section  
5 that comes into contact with said chuck claw;

6           said bolt is set up to attach to said bearing surface in such a direction that, going  
7    toward a rear end of said arm, said bolt extends from said bearing surface toward a back  
8    surface relative to a side of said arm in contact with said chuck claw.

1    21. A chuck device as described in claim 20 wherein:

2           an arm shaft rotatably supporting said arm is disposed behind said bearing surface;  
3    and  
4           said bolt is screwed in between said bearing surface and said arm shaft.

1    22. A chuck device as described in claim 20 wherein:

2           left and right arms are disposed;  
3           a bearing surface is disposed inward from each arm;  
4           said bolts pass through said support pieces from inward of said arms and are  
5    screwed into said arms; and  
6           slits are disposed at ends of said chuck claws to allow insertion of a tool used to  
7    manipulate said bolts.

1    23. A chuck device as described in claim 22 wherein a spring mechanism is disposed  
2    between said support pieces attached to said bearing surfaces of said arms to draw said  
3    support pieces toward each other.

1    24. A chuck claw wherein:

2           a grasping section performing grasping actions is formed on a first end; and  
3           an attachment base curved to form a cylindrical surface is formed on a second end.

1    25. A chuck claw as described in claim 24 wherein a slit extending in a perimeter direction  
2    of a cylindrical surface defined by said attachment base is disposed on said attachment base.

1       26. A chuck claw as described in claim 24 wherein a slit that divides said grasping section  
2       along a direction of an axis of a cylindrical surface defined by said attachment base is  
3       formed on said grasping section.

1       27. A conveyor device comprising:  
2            a mobile body capable of pivoting around a predetermined center; and  
3            a chuck device as described in claim 17;  
4            wherein a plurality of said chuck devices are disposed along an outer perimeter of  
5        said mobile body.

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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claim 1 (currently amended): A chuck device for containers comprising:

a supporting structuremeans;

a pair of arms rotatably supported on said supporting structuremeans by way of a pair of arm shafts, chuck claws for grasping a container being disposed on ends of said pair of arms that open and close in tandem with a rotation around said arm shafts; and

an operation member capable of being externally operated on from outside;

wherein:

inward from said pair of arms is disposed a first drive section capable of integrally rotating around said arm shaft of a first arm and being integralintegrally with said first arm, and a second drive section disposed further toward said end of said arm than said first drive section and capable of rotating integrally around said arm shaft of a second arm and being integralintegrally with said second arm;

a biasing mechanism whichmeans biases said pair of arms around said arm shafts in a direction of closing said ends of said arms;

a motion input mechanism is disposed between said operation member and said first drive section whichand converts motion accompanying external operation of said operation member from outside to a rotation motion of said first drive section centered around said arm shaft; and

a coupling mechanism is disposed between said first drive section and said second drive section whichand converts rotational motion of said drive section around said arm shaft to a rotational motion of said second drive section around said arm shaft.

Claim 2 (currently amended): A chuck device as described in claim 1 wherein said motion input mechanism comprises~~uses~~ a cam mechanism to convert a motion of said operation member to rotation motion of said first drive section.

Claim 3 (currently amended): A chuck device as described in claim 2 wherein: said cam mechanism of said motion input mechanism is equipped with an arm drive cam supported by said support structures~~supported means~~ to allow rotation around a cam axis line parallel to said arm shaft, a cam surface being formed on an outer perimeter of said arm drive cam;

    said arm drive cam being~~is~~ disposed opposite from said second drive section relative to said first drive section;

such that said arm drive cam being~~is~~ rotated by operation of said operation member from outside;

    as said arm drive cam rotates, said cam surface of said arm drive cam moves back and forth between a position where said first drive section is pushed out toward said second drive section and a position where said first drive section is retracted to an opposite side from said second drive section.

Claim 4 (original): A chuck device as described in claim 3 wherein a first roller that comes into contact with said cam surface of said arm drive cam is disposed on said first drive section.

Claim 5 (original): A chuck device as described in claim 3 wherein:  
    a roller shaft parallel to said arm shaft is disposed on said first drive section; and  
    on said roller shaft, there is disposed a first roller coming into contact with said cam surface of said arm drive cam, and a second roller coming into contact with said second drive section.

Claim 6 (currently amended): A chuck device as described in ~~any one of~~ claim 3 through ~~claim 5~~ wherein a support section is disposed on said cam surface of said arm drive cam to support said first drive section at said position pushed out toward said second drive section.

Claim 7 (currently amended): A chuck device as described in ~~any one of~~ claim 1 through ~~claim 6~~ wherein said coupling mechanism ~~comprises~~uses a cam mechanism to convert rotation motion of said first drive section to rotation motion of said second drive section.

Claim 8 (original): A chuck device as described in claim 7 wherein said cam mechanism of said coupling mechanism is equipped with a cam surface disposed on said second drive section and coming into contact with said first drive section.

Claim 9 (currently amended): A chuck device as described in ~~any one of~~ claim 1 through ~~claim 8~~ wherein said biasing ~~mechanism~~means includes ~~a~~ spring ~~means~~ disposed between said support ~~structure~~means and said second arm and biasing said second arm so that said chuck claws are biased in a closing direction.

Claim 10 (currently amended): A chuck device as described in ~~any one of~~ claim 1 through ~~claim 8~~ wherein said biasing ~~mechanism~~means includes torsion coil springs on each of said pair of arm shafts to bias said pair of arms so that said ends are biased in a closing direction.

Claim 11 (currently amended): A chuck device as described in claim 3 wherein: as-said biasing ~~mechanism~~includes~~means~~, torsion coil springs ~~are~~ disposed on each of said pair of arm shafts to bias said pair of arms so that said ends are biased in a closing direction; and

both ends of a cam shaft rotatably supporting said pair of arm shafts and said arm drive cam are supported by said supporting structuremeans.

Claim 12 (currently amended): A conveyor device for containers comprising:  
a chuck device as described in ~~any one of~~ claim 1 ~~through~~ claim 11; and  
a mobile body moving said support structuremeans of said chuck device along a predetermined conveyor path.

Claim 13 (original): A conveyor device as described in claim 13 wherein a plurality of said chuck devices are disposed on said mobile body along said conveyance path.

Claim 14 (currently amended): A conveyor device as described in claim ~~12-13~~ or claim 14 wherein an operation section is disposed along said conveyance path that comes into contact with said operation member when said chuck device moves.

Claim 15 (original): A conveyor device as described in claim 14 wherein said operation section includes a movable section capable of moving between an active position, where said operation section is in contact with said operation member and operates said operation member, and a stand-by position away from said operation member.

Claim 16 (original): A conveyor device as described in claim 15 wherein said movable section is driven by an electrical servo motor between said active position and said stand-by position.

Claim 17 (currently amended): In a chuck device wherein a chuck claw is removably mounted on an end of an arm driven to perform a grasping action,  
a chuck device wherein:  
a cylindrically indented bearing surface is disposed on said arm;

a holding piece equipped with a cylindrical outer perimeter surface curved along said bearing surface is disposed on said bearing surface using a tightening mechanism~~means~~; and

an attachment base curved along said bearing surface and capable of being inserted between said support piece and said bearing surface ~~is~~ disposed on said chuck claw.

Claim 18 (currently amended): A chuck device as described in claim 17 wherein said tightening mechanism ~~comprises~~~~means~~ is a bolt.

Claim 19 (original): A chuck device as described in claim 18 wherein a slit is formed on said attachment base of said chuck claw to allow said bolt to pass through.

Claim 20 (currently amended): A chuck device as described in claim 18 ~~or claim 19~~ wherein:

a chuck bearing is disposed on said arm to receive reaction generated on said chuck claw during said grasping action;

said bearing surface is formed to connect with a side of said chuck bearing section that comes into contact with said chuck claw;

said bolt is set up to attach to said bearing surface in such a direction that, going toward a rear end of said arm, said bolt extends from said bearing surface toward a back surface relative to a side of said arm in contact with said chuck claw.

Claim 21 (original): A chuck device as described in claim 20 wherein:

an arm shaft rotatably supporting said arm is disposed behind said bearing surface; and

said bolt is screwed in between said bearing surface and said arm shaft.

Claim 22 (currently amended): A chuck device as described in claim 20 ~~or claim 21~~ wherein:

left and right arms are disposed;

Claim 22 (currently amended): A chuck device as described in claim 20 ~~or claim 21~~ wherein:

left and right arms are disposed;  
a bearing ~~surface~~ is disposed inward from each arm;  
said bolts pass through said support pieces from inward of said arms and are screwed into said arms; and  
slits are disposed at ends of said chuck claws to allow insertion of a tool used to manipulate said bolts.

Claim 23 (currently amended): A chuck device as described in claim 22 wherein ~~a spring mechanism~~ is disposed between said support pieces attached to said bearing surfaces of said arms to draw said support pieces toward each other.

Claim 24 (currently amended): A chuck claw wherein:

a grasping section performing grasping actions is formed on a first end; and  
an attachment base curved to form a cylindrical surface is formed on a second end.

Claim 25 (original): A chuck claw as described in claim 24 wherein a slit extending in a perimeter direction of a cylindrical surface defined by said attachment base is disposed on said attachment base.

Claim 26 (currently amended): A chuck claw as described in claim 24 ~~or claim 25~~ wherein a slit that divides said grasping section along a direction of an axis of a cylindrical surface defined by said attachment base is formed on said grasping section.

Claim 27 (currently amended): A conveyor device comprising:

a mobile body capable of pivoting around a predetermined center; and  
a chuck device as described in ~~any one of~~ claim 17 ~~through~~ claim 23;

wherein a plurality of said chuck devices are disposed along an outer perimeter of said mobile body.